

Trend Study 23-5-03

Study site name: Smith Canyon.

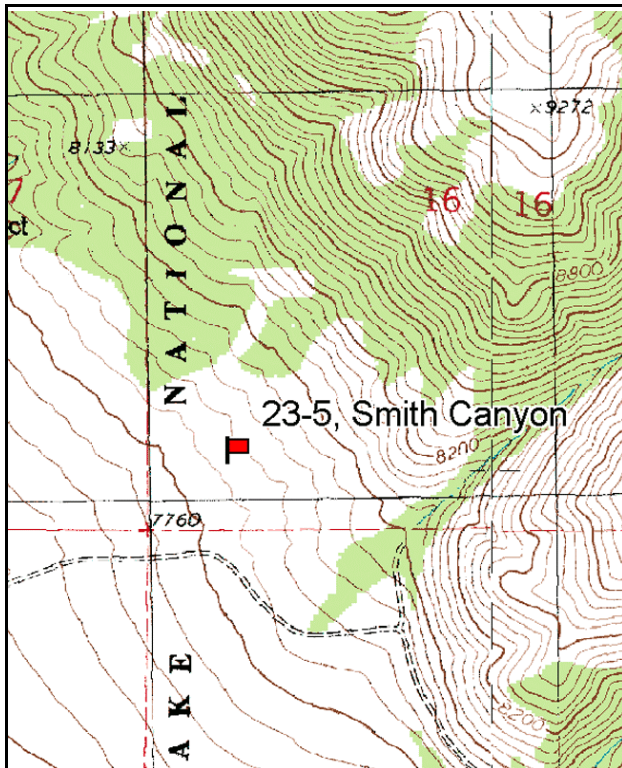
Vegetation type: Big Sagebrush-Grass.

Compass bearing: frequency baseline 180 degrees magnetic.

Frequency belt placement: line 1 (11 & 95ft), line 2 (34ft), line 3 (59ft), line 4 (71ft). Rebar: belt 4 on 4ft, belt 5 on 1ft.

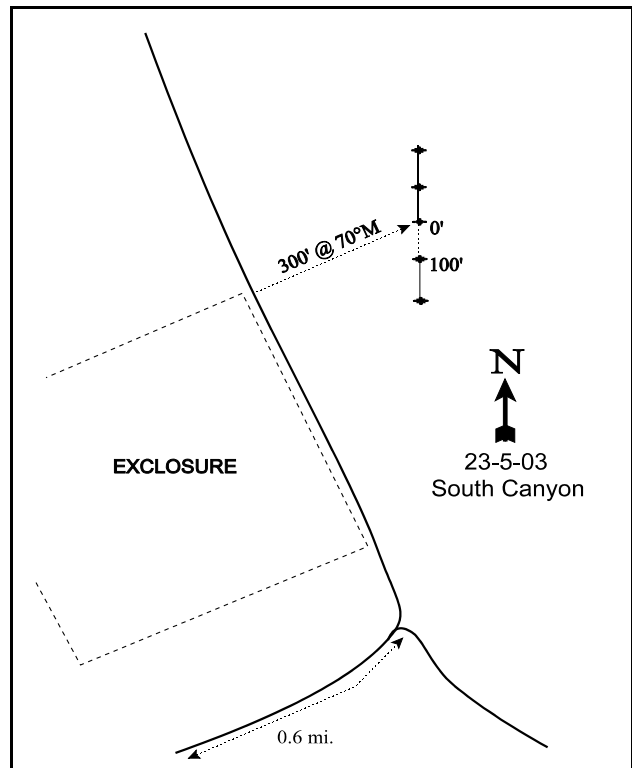
LOCATION DESCRIPTION

From the intersection of Main Street (SR89) and Center Street in Marysvale, turn east and proceed 0.7 miles, crossing a bridge. At a three-way split in the road, stay left and continue 1.9 miles. Keep right and go 0.8 miles. Keep right at the split, then go immediately right again. Proceed another 0.8 miles and make a left turn. Go 2.75 miles up this road to a "T" intersection. Turn right and go 1.0 miles to a cattleguard. Turn hard left here and drive 0.1 miles, then right 0.6 miles to an enclosure. Turn north (left) and go along the east side of a cattle enclosure. From the northeast corner of the enclosure, walk 300 feet at 70 degrees (in line with the north side fence) to the start of the baseline. The 0-foot end is marked by a rebar with a browse tag #7043 attached.



Map Name: Marysvale

Township 27S, Range 2.5W, Section 16



Diagrammatic Sketch

GPS: NAD 27, UTM 12S 4257082 N, 401193 E

DISCUSSION

Smith Canyon - Trend Study No. 23-5

The Smith Canyon trend study is located on the southwestern side of Marysvale Peak, at an elevation of about 7,800 feet. The foothills here level out to form open, gentle sagebrush covered slopes (about 3-5% slope). Much of the area has been chained and seeded. Now there are scattered junipers, clumps of Gambel oak, and curlleaf mountain mahogany. An adjacent cattle exclosure displays similar vegetation, yet the plants there appear slightly more vigorous. Grazing pressure from livestock appears light on this Forest Service land. Browsing pressure from wintering wildlife has been heavy at times. The importance of this area is demonstrated by the DWR Smith Canyon pellet group transect which has shown more use than any other pellet group transect on the unit. Data showed a 10-year average (1980-81 to 1990-91) of 55 deer days use/acre (135 ddu/ha) (Jense et al. 1985, 1991). Although use is concentrated in winter, tracks and sightings indicate deer use is common year-round. Elk have been noted in the area and if the herd continues to increase, this may become an important elk wintering area as well. A pellet group transect read along the trend study baseline in 1998 estimated 112 deer days use/acre (277 ddu/ha). Deer use continued to be high in 2003 at an estimated 139 days use/acre (343 ddu/ha). Most of the pellet groups appeared to be from winter use but about 40% were from late winter or early spring. Elk use was estimated at just 7 days use/acre (17 edu/ha). Cattle use was estimated at 14 days use/acre (35 cdu/ha) in 1998 and 3 in 2003 (7 cdu/ha).

The soil appears to be well-developed and protected on this site. Litter cover is moderately high from the diverse and healthy plant community. Soil texture is a sandy loam which is moderately acidic in reactivity (pH 5.9). Effective rooting depth is estimated at nearly 12 inches. There is a relatively dense cover of vegetation over much of the transect, leaving little bare soil. Pavement occupies much of the space between vegetation. Erosion could be severe on this soil type, but the ground cover and gentle slope tend to minimize the problem.

Mountain big sagebrush is the dominant shrub species as it makes up more than three-fourths of the browse cover. The subspecies *Artemisia tridentata vaseyana* is considered a very palatable sagebrush, yet it is not as utilized as the bitterbrush on this site. The sagebrush population shows a relatively large decrease in numbers from 1991 to 1998. However, only about 25% of this decrease can be explained by the number of dead plants in the population. Therefore, most of the decrease would be due to the larger sampling design giving greater accuracy in estimating shrub populations that are discontinuous and/or clumped in their distributions. Density was estimated at 3,860 plants/acre in 1998. Use was moderate, vigor good, and the number of decadent plants was low at 18%. Population density remained similar in 2003 at 3,400 plants/acre. Drought conditions combined with competition from other sagebrush and cheatgrass caused an increase in the number of decadent plants (18% to 41%). Average vigor remains good but no seedlings were encountered in 1998 or 2003 and young plants accounted for only 1% of the population in 2003.

Antelope bitterbrush has maintained a relatively stable density since site establishment in 1985. It displays similar trends as sagebrush with a minor decline in density between 1998 and 2003 combined with a major increase in decadent plants (8% to 58%). Bitterbrush has sustained heavy use since 1991, peaking during the drought years of 1991 and 2003. Annual leader growth averaged 3.2 inches in 2003, but the plants did not appear to be flowering or producing seed. Juniper, Gambel oak, and mountain mahogany are abundant nearby and appear to be spreading slowly. These trees provide the only good escape and thermal cover in the area.

The herbaceous understory is abundant but dominated by annual cheatgrass. Bluebunch wheatgrass, mutton bluegrass, and bottlebrush squirreltail were growing well and were fairly abundant, especially under shrub crowns in 1985 and 1991. Annuals were not included in data collection in 1985 and 1991, but site narratives indicate that cheatgrass was present, but made up only a small percentage of the vegetation. By 1998, cheatgrass contributed 68% of the grass cover with a cover value of 11%. In 2003, cheatgrass increased in

frequency and cover, accounting for 92% of the grass cover with a cover value of 17%. Utilization of grasses has been generally light.

There is good diversity of valuable perennial forbs on the site, but they are not very common. Total forb cover was estimated at only 3% in 1998 and 5% in 2003. The most abundant is silky lupine, which grows tall and vigorous. Other useful forbs include arrowleaf balsamroot, redroot eriogonum, and tapertip hawksbeard. Density is rather low and most of these plants are small and low-growing, yet they show utilization by wildlife.

1985 APPARENT TREND ASSESSMENT

As this is such a heavily used and important winter range, it is vital to monitor the community to help prevent severe downward trends. Continued heavy use could be detrimental to the bitterbrush population. Light spring cattle grazing or elk use can help to release young browse plants from perennial grass competition, especially here where the grasses grow thick under the cover of the sagebrush. As the junipers and oaks increase, they will provide excellent cover, but a continuous stand would not be desirable. Generally, vegetative trend appears stable to slightly downward because of the heavy pressure on the bitterbrush. The soil appears stable and in good condition.

1991 TREND ASSESSMENT

Percent bare ground has increased from 4 to 11% and vegetative basal cover has decreased from 8% to 4%. The common denominator appears to be the drought. Precipitation data from Marysville indicate drier than average conditions from 1988 to 1991. This downward trend should be watched closely, but should improve with improved precipitation patterns. The two key browse species, mountain big sagebrush and bitterbrush, are both increasing in density, 16% and 20% respectively. Percent decadence has gone down for sagebrush, but has gone up sharply for bitterbrush. The increased decadence for bitterbrush could be a combination of heavy use and drought. Even with the increase in decadence, the browse trend is still considered to be improving. With increased moisture, the degree of decadence for bitterbrush would be expected to go down. The herbaceous understory is also on an upward trend, with most of the grasses and forbs increasing in frequency.

TREND ASSESSMENT

soil - slightly down (2)

browse - slightly up (4)

herbaceous understory - up slightly (4)

1998 TREND ASSESSMENT

The trend for soil is slightly down because of significant decreases in grass and forb nested frequency values which are the lowest they have ever been. The browse trend is stable. Mountain big sagebrush shows similar use (moderate) compared to 1991. Average vigor has improved and the number of decadent plants has declined. Bitterbrush is still heavily browsed although the number of decadent plants has declined from 55% to only 8%. The trend for the herbaceous understory is slightly down because nested frequency values for both perennial grasses and forbs has decreased since 1991.

TREND ASSESSMENT

soil - slightly down (2)

browse - stable (3)

herbaceous understory - slightly down (2)

2003 TREND ASSESSMENT

Trend for soil is stable. Ground cover characteristics have remained similar to 1998 estimates and there is still abundant protective ground cover to prevent erosion. Trend for the key browse species, mountain big sagebrush and bitterbrush, is down. Sagebrush has declined slightly in density. It displays mostly light to moderate use and good vigor, but the number of decadent plants has increased to 41% of the population. In addition, 17% of the decadent plants sampled were classified as dying. Young recruitment is poor and not adequate to maintain the population at current levels. Bitterbrush shows extremely heavy use. The number of decadent plants has increased from 8% of the population to 58%. Vigor is poor on 35% of the plants sampled and 60% of the decadent bitterbrush encountered were classified as dying (>50% crown death). Young recruitment is nonexistent this year indicating a possible future bitterbrush die-off. These browse trends are caused by a combination of use, drought, and competition with cheatgrass in the understory. Trend for the herbaceous understory is also down. Sum of nested frequency for perennial grasses and forbs has declined, while nested frequency for cheatgrass increased significantly. Average cover for cheatgrass is 17% in 2003. Cheatgrass is vigorous and tall providing ample fine fuels for a wildfire.

TREND ASSESSMENT

soil - stable (3)

browse - down (1)

herbaceous understory - down (1)

HERBACEOUS TRENDS --

Management unit 23 , Study no: 5

Type	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
G	Agropyron spicatum	_b 179	_b 176	_b 195	_a 75	4.20	.58
G	Bromus tectorum (a)	-	-	_a 305	_b 342	10.56	17.33
G	Hilaria jamesii	-	-	3	-	.15	-
G	Poa fendleriana	_a 58	_b 78	_a 28	_a 32	.25	.33
G	Poa secunda	-	-	6	7	.01	.21
G	Sitanion hystrix	_{ab} 47	_b 64	_a 28	_a 36	.22	.35
G	Stipa comata	-	4	5	1	.18	.00
Total for Annual Grasses		0	0	305	342	10.56	17.33
Total for Perennial Grasses		284	322	265	151	5.02	1.48
Total for Grasses		284	322	570	493	15.59	18.82
F	Agoseris glauca	-	6	-	7	.00	.01
F	Alyssum alyssoides (a)	-	-	_a 3	_b 11	.00	.07
F	Arabis spp.	-	4	3	-	.00	-
F	Astragalus convallarius	17	6	9	10	.19	.16
F	Astragalus spp.	-	12	3	2	.01	.03
F	Balsamorhiza sagittata	-	5	2	-	.01	-
F	Calochortus nuttallii	_a -	_b 9	_a 1	_a -	.00	-

T y p e	Species	Nested Frequency				Average Cover %	
		'85	'91	'98	'03	'98	'03
F	Chaenactis douglasii	-	-	5	-	.01	-
F	Comandra pallida	5	5	1	4	.03	.03
F	Collinsia parviflora (a)	-	-	_a 2	_b 82	.00	.69
F	Crepis acuminata	_{ab} 4	_b 14	_a -	_a -	-	-
F	Cryptantha nana	3	-	-	-	-	-
F	Eriogonum racemosum	_a 20	_b 59	_a 21	_a 9	.29	.12
F	Eriogonum umbellatum	_a -	_a -	_{ab} 3	_b 11	.00	.08
F	Lotus utahensis	_a -	_a 1	_b 16	_a 1	.30	.00
F	Lupinus argenteus	_b 74	_b 46	_a 18	_a 6	1.55	.76
F	Microsteris gracilis (a)	-	-	_a 11	_b 170	.02	2.63
F	Phlox longifolia	_{bc} 42	_c 50	_{ab} 21	_a 3	.11	.00
F	Sphaeralcea coccinea	-	3	-	-	-	-
F	Streptanthus cordatus	4	2	1	2	.00	.00
F	Wyethia amplexicaulis	_b 11	_a -	_a -	_a -	-	-
Total for Annual Forbs		0	0	16	263	0.02	3.40
Total for Perennial Forbs		180	222	104	55	2.53	1.22
Total for Forbs		180	222	120	318	2.56	4.62

Values with different subscript letters are significantly different at alpha = 0.10

BROWSE TRENDS --

Management unit 23 , Study no: 5

T y p e	Species	Strip Frequency		Average Cover %	
		'98	'03	'98	'03
B	Artemisia tridentata vaseyana	88	88	24.61	24.54
B	Chrysothamnus nauseosus albicaulis	1	0	-	-
B	Chrysothamnus viscidiflorus viscidiflorus	2	0	-	-
B	Eriogonum microthecum	2	0	-	-
B	Pinus edulis	1	1	-	-
B	Purshia tridentata	44	36	6.61	3.71
B	Sclerocactus	2	0	-	-
B	Symphoricarpos oreophilus	1	2	-	-
B	Tetradymia canescens	0	1	-	-
Total for Browse		141	128	31.22	28.26

CANOPY COVER, LINE INTERCEPT --
Management unit 23 , Study no: 5

Species	Percent Cover
	'03
Artemisia tridentata vaseyana	28.85
Purshia tridentata	5.46
Symphoricarpos oreophilus	.10

KEY BROWSE ANNUAL LEADER GROWTH --
Management unit 23 , Study no: 5

Species	Average leader growth (in)
	'03
Artemisia tridentata vaseyana	1.7
Purshia tridentata	3.2

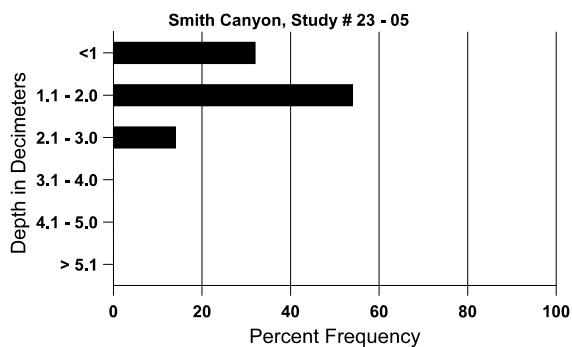
BASIC COVER --
Management unit 23 , Study no: 5

Cover Type	Average Cover %			
	'85	'91	'98	'03
Vegetation	8.00	4.25	40.73	49.27
Rock	1.00	1.25	2.75	2.19
Pavement	18.50	8.75	12.96	16.32
Litter	68.25	73.25	54.14	45.69
Cryptogams	.75	1.25	.12	.03
Bare Ground	3.50	11.25	13.71	10.39

SOIL ANALYSIS DATA --
Management unit 23, Study no: 5, Study Name: Smith Canyon

Effective rooting depth (in)	Temp °F (depth)	pH	%sand	%silt	%clay	%OM	PPM P	PPM K	ds/m
11.9	66.7 (11.9)	5.9	54.0	29.4	16.6	3.5	21.9	281.6	0.4

Stoniness Index



PELLET GROUP DATA --

Management unit 23 , Study no: 5

Type	Quadrat Frequency		Days use per acre (ha)	
	'98	'03	'98	'03
Elk	-	-	1 (2)	7 (17)
Rabbit	26	3	-	-
Deer	34	27	112 (277)	139 (344)
Cattle	3	-	14 (35)	3 (7)

BROWSE CHARACTERISTICS --

Management unit 23 , Study no: 5

		Age class distribution (plants per acre)					Utilization				
Y	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
<i>Amelanchier utahensis</i>											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
98	0	-	-	-	-	-	0	0	-	0	24/17
03	0	-	-	-	-	-	0	0	-	0	9/9
<i>Artemisia tridentata vaseyana</i>											
85	6066	66	666	3800	1600	-	54	11	26	15	24/27
91	7199	-	133	5466	1600	-	50	3	22	12	22/30
98	3860	-	140	3040	680	840	46	7	18	5	32/44
03	3400	-	20	1980	1400	660	26	5	41	7	31/39
<i>Chrysothamnus nauseosus albicaulis</i>											
85	0	-	-	-	-	-	0	0	0	0	-/-
91	0	-	-	-	-	-	0	0	0	0	-/-
98	20	-	-	-	20	-	0	0	100	0	-/-
03	0	-	-	-	-	-	0	0	0	0	-/-
<i>Chrysothamnus viscidiflorus viscidiflorus</i>											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
98	40	-	-	40	-	-	0	50	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	-/-
<i>Eriogonum microthecum</i>											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	199	-	133	66	-	-	0	33	-	0	1/2
98	60	-	40	20	-	-	0	33	-	0	-/-
03	0	-	-	-	-	-	0	0	-	0	-/-

		Age class distribution (plants per acre)					Utilization				
Year	Plants per Acre (excluding seedlings)	Seedling	Young	Mature	Decadent	Dead	% moderate	% heavy	% decadent	% poor vigor	Average Height Crown (in)
Opuntia spp.											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
98	0	-	-	-	-	-	0	0	-	0	5/11
03	0	-	-	-	-	-	0	0	-	0	-/-
Pinus edulis											
85	0	-	-	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
98	20	-	20	-	-	-	0	0	-	0	-/-
03	20	-	-	20	-	-	0	0	-	0	-/-
Purshia tridentata											
85	1066	66	200	866	-	-	69	31	0	0	20/27
91	1332	-	66	533	733	-	15	80	55	0	13/20
98	1220	-	180	940	100	120	26	67	8	0	20/37
03	1040	-	-	440	600	20	15	79	58	35	19/39
Sclerocactus											
85	0	-	-	-	-	-	0	0	0	0	-/-
91	0	-	-	-	-	-	0	0	0	0	-/-
98	80	-	-	20	60	-	0	75	75	0	-/-
03	0	-	-	-	-	-	0	0	0	0	-/-
Symphoricarpos oreophilus											
85	0	-	-	-	-	-	0	0	0	0	-/-
91	66	-	66	-	-	-	0	100	0	0	-/-
98	20	-	-	20	-	-	0	0	0	0	13/28
03	60	-	-	40	20	-	0	0	33	33	8/14
Tetradymia canescens											
85	133	-	133	-	-	-	0	0	-	0	-/-
91	0	-	-	-	-	-	0	0	-	0	-/-
98	0	-	-	-	-	-	0	0	-	0	-/-
03	20	-	-	20	-	-	0	0	-	0	11/13